

09/807728

IC07 Rec'd PCT/PTO

18 APR 2001



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
REQUEST FOR FILING NATIONAL PHASE OF
PCT APPLICATION UNDER 35 U.S.C. 371 AND 37 CFR 1.494 OR 1.495

To: Commissioner of Patents
 Washington, D.C. 20231



00909

TRANSMITTAL LETTER TO THE UNITED STATES

Atty Dkt: P 280126

DESIGNATED/ELECTED OFFICE (DO/EO/US)

/110014802US/WDO/SUP

M#

/Client Ref.

From: Pillsbury Winthrop LLP, IP Group:

Date: April 18, 2001

This is a **REQUEST** for **FILING** a PCT/USA National Phase Application based on:

- | | | |
|---|---|---|
| 1. International Application

PCT/SE99/01878
<u> </u> <u> </u> <u> </u> <u> </u> <u> </u> <u> </u>
↑ country code | 2. International Filing Date

19 OCT 1999
Day MONTH Year | 3. Earliest Priority Date Claimed

19 OCT 1998
Day MONTH Year
(use item 2 if no earlier priority) |
|---|---|---|

4. Measured from the earliest priority date in item 3, this PCT/USA National Phase Application Request is being filed within:

(a) ☐ 20 months from above item 3 date (b) ☒ 30 months from above item 3 date,

(c) Therefore, the due date (unextendable) is April 19, 2001

5. Title of Invention MEASURING OF FIBER PROPERTIES

6. Inventor(s) KARLSSON, Hakan et al

Applicant herewith submits the following under 35 U.S.C. 371 to effect filing:

7. ☒ Please immediately start national examination procedures (35 U.S.C. 371 (f)).

☐ **A copy of the International Application** as filed (35 U.S.C. 371(c)(2)) is transmitted herewith (file if in English but, if in foreign language, file only if not transmitted to PTO by the International Bureau) including:

- a. ☐ Request;
 b. ☐ Abstract;
 c. _____ pgs. Spec. and Claims;
 d. _____ sheet(s) Drawing which are ☐ informal ☐ formal of size ☐ A4 ☐ 11"

9. ☒ **A copy of the International Application has been transmitted by the International Bureau.**

10. **A translation of the International Application** into English (35 U.S.C. 371(c)(2))

- a. ☒ is transmitted herewith including: (1) ☒ Request; (2) ☒ Abstract;
 (3) 8 pgs. Spec. and Claims;
 (4) 1 sheet(s) Drawing which are:
 ☐ informal ☒ formal of size ☒ A4 ☐ 11"
- b. ☐ is not required, as the application was filed in English.
 c. ☐ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.
 d. ☐ Translation verification attached (not required now).

RE: USA National Phase Filing of PCT /SE99/01878

JC03 Rec'd PCT/PTO

18 APR 2001

11. ☒ Please see the attached Preliminary Amendment
12. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., before 18th month from first priority date above in item 3, are transmitted herewith (file only if in English) including:
13. ☒ PCT Article 19 claim amendments (if any) have been transmitted by the International Bureau
14. ☐ Translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., of claim amendments made before 18th month, is attached (required by 20th month from the date in item 3 if box 4(a) above is X'd, or 30th month if box 4(b) is X'd, or else amendments will be considered canceled).
15. **A declaration of the inventor** (35 U.S.C. 371(c)(4))
 a. ☐ is submitted herewith ☐ Original ☐ Facsimile/Copy
 b. ☒ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.
16. **An International Search Report (ISR):**
 a. Was prepared by ☐ European Patent Office ☐ Japanese Patent Office ☒ Other
 b. ☒ has been transmitted by the international Bureau to PTO.
 c. ☒ copy herewith (2 pg(s).) ☒ plus Annex of family members (1 pg(s).).
17. **International Preliminary Examination Report (IPER):**
 a. ☒ has been transmitted (if this letter is filed after 28 months from date in item 3) in English by the International Bureau with Annexes (if any) in original language.
 b. ☒ copy herewith in English.
 c.1 ☒ IPER Annex(es) in original language ("Annexes" are amendments made to claims/spec/drawings during Examination) including attached amended:
 c.2 ☒ Specification/claim pages #1, 2, 2a, 7 claims #1-7
 Dwg Sheets #
 d. ☒ Translation of Annex(es) to IPER (required by 30th month due date, or else annexed amendments will be considered canceled).
18. **Information Disclosure Statement** including:
 a. ☒ Attached Form PTO-1449 listing documents
 b. ☒ Attached copies of documents listed on Form PTO-1449
 c. ☒ A concise explanation of relevance of ISR references is given in the ISR.
19. ☐ **Assignment** document and Cover Sheet for recording are attached. Please mail the recorded assignment document back to the person whose signature, name and address appear at the end of this letter.
20. ☐ Copy of Power to IA agent.
21. ☐ **Drawings** (complete only if 8d or 10a(4) not completed): ___ sheet(s) per set: ☐ 1 set informal;
☐ Formal of size ☐ A4 ☐ 11"
22. Small Entity Status ☒ is **Not** claimed ☐ is claimed (pre-filing confirmation required)
 22(a) ___ (No.) Small Entity Statement(s) enclosed (since 9/8/00 Small Entity Statements(s) not essential to make claim)
23. **Priority** is hereby claimed under 35 U.S.C. 119/365 based on the priority claim and the certified copy, both filed in the International Application during the international stage based on the filing in (country) Sweden of:

Application No.	Filing Date	Application No.	Filing Date
(1) 9803557.9	19 Oct 1998	(2) _____	_____
(3) _____	_____	(4) _____	_____
(5) _____	_____	(6) _____	_____

 a. ☒ See Form PCT/IB/304 sent to US/DO with copy of priority documents. If copy has not been received, please proceed promptly to obtain same from the IB.
 b. ☒ Copy of Form PCT/IB/304 attached.

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1 8 APR 2001

24. Attached:

25 Per Item 17.c2, cancel original pages #____, claims #____, Drawing Sheets #26. **Calculation of the U.S. National Fee (35 U.S.C. 371 (c)(1)) and other fees is as follows:**Based on amended claim(s) per above item(s) ☐ 12, ☐ 14, ☒ 17, ☐ 25 (hilit)

Total Effective Claims	minus 20 =	x \$18/\$9 =	\$0	966/967
Independent Claims	minus 3 =	x \$80/\$40 =	\$0	964/965
If any proper (ignore improper) Multiple Dependent claim is present,		add \$270/\$135	+0	968/969

BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(4)): →→ **BASIC FEE REQUIRED, NOW** →→→→A. If country code letters in item 1 are not "US", "BR", "BB", "TT", "MX", "IL", "NZ", "IN" or "ZA"

See item 16 re:

1. Search Report was <u>not</u> prepared by EPO or JPO -----	add \$1000/\$500	960/961
2. Search Report was prepared by EPO or JPO -----	add \$860/\$430	970/971
	<u>+1000</u>	

SKIP B, C, D AND E UNLESS country code letters in item 1 are "US", "BR", "BB", "TT", "MX", "IL", "NZ", "IN" or "ZA"

(X) <input type="checkbox"/> B. If <u>USPTO</u> did not issue <u>both</u> International Search Report (ISR) and (if box 4(b) above is X'd) the International Examination Report (IPER), -----	add \$1000/\$500	+0	960/961
(only) <input type="checkbox"/> C. If <u>USPTO</u> issued ISR but not IPER (or box 4(a) above is X'd), -----	add \$710/\$355	+0	958/959
(one) <input type="checkbox"/> D. If <u>USPTO</u> issued IPER but IPER Sec. V boxes <u>not</u> all 3 YES, -----	add \$690/\$345	+0	956/957
(of) <input type="checkbox"/> E. If international preliminary examination fee was paid to <u>USPTO</u> and Rules 492(a)(4) and 496(b) <u>satisfied</u> (IPER Sec. V <u>all</u> 3 boxes YES for <u>all</u> claims), -----	add \$100/\$50	+0	962/963

27. **SUBTOTAL = \$1000**

28. If Assignment box 19 above is X'd, add Assignment Recording fee of ----\$40 +0 (581)

29. Attached is a check to cover the ----- **TOTAL FEES \$1000**

Our Deposit Account No. 03-3975

Our Order No. 70051 | 280126
C# M#

00909

CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 and 492 (missing or insufficient fee only) now or hereafter relative to this application and the resulting Official document under Rule 20, or credit any overpayment, to our Account/Order Nos. shown above for which purpose a duplicate copy of this sheet is attached.This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal form is filed**Pillsbury Winthrop LLP
Intellectual Property Group**By Atty: Anthony L. MieleReg. No. 34393Sig: Bgl/Kedw 1/6/98Fax: (202) 822-0944
Tel: (202) 861-3568

Atty/Sec: ALM/sdm

NOTE: File in duplicate with 2 postcard receipts (PAT-103) & attachments.

09/807728
JC03 Rec'd PCT/PTO 1 8 APR 2001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION OF

Inventor(s): KARLSSON et al

Filed: Herewith

Title: MEASURING OF FIBER PROPERTIES

APRIL 18, 2001

PRELIMINARY AMENDMENTHon. Commissioner of Patents
Washington, D.C. 20231

Sir:

Please amend this application as follows:

IN THE SPECIFICATION:

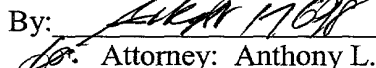
At the top of the first page, just under the title, insert

☒ --This application is the National Phase of International Application
PCT/SE99/01878 filed October 19, 1999 which designated the U.S.

and that International Application

☒ was ☐ was not published under PCT Article 21(2) in English.--

Respectfully submitted,

PILLSBURY WINTHROP LLP
Intellectual Property GroupBy: 
Attorney: Anthony L. Miele
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1100 New York Avenue, NW
Ninth Floor
Washington, DC 20005-3918
(202) 861-3000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION of:

KARLSSON, et al.

Group Art Unit: Unknown

Application No.: 09/807,728

Examiner: Unknown

Filed: April 18, 2001

FOR: MEASURING OF FIBER PROPERTIES

* * * * *

July 17, 2001

PRELIMINARY AMENDMENT

Hon. Commissioner of Patents
Washington, D.C. 20231

Sir:

Please amend this application as follows:

IN THE CLAIMS:

3. (Amended) Device according to claim 1, characterised in that the periphery of the other limiting surface extends to reach an outer wall (36) of the measuring cell (10) and that a intermediate space occurs between the periphery of the said one limiting surface and the outer wall (36) to form a peripheral field (54).

4. (Amended) Device according to claim 1, characterised in that the distance between the limiting surfaces is adjustable within the range of 0.5-5 mm.

5. (Amended) Device according to claim 1, characterised in that the inlet opening (38) is positioned centrally with regard to the said one limiting surface to obtain a radial

Application of KARLSSON et al. - 09/807,728

suspension flow in the measuring field (48) having circular limiting surfaces, with a pressure that diminishes in a radial direction.

6. (Amended) Device according to claim 1, characterised in that the other limiting surface is rotatable by the aid of a motor (72).

7. (Amended) Device according to claim 1, characterised in that the area of the inlet tube (42) across the direction of flow is greater than the area of the measuring field (48) across the direction of flow immediately after the inlet opening (38).

8. (Amended) Device according to claim 1, characterised in that the said outer wall (36) of the measuring cell (10) is provided with stop elements (66, 68) to limit the movement of the piston cylinder in an upper and a lower position.

9. (Amended) Device according to claim 1, characterised in that the inlet opening (38) is positioned centrally with regard to the said one limiting surface to obtain a radial suspension flow in the measuring field (48) with a pressure that diminishes in a radial direction.

10. (Amended) Device according to claim 1, characterised in that the moveable limiting surface can rotate with the aid of a motor (72).

Application of KARLSSON et al. - 09/807,728

11. (Amended) Device according to claim 2, characterised in that the area of the inlet tube (42) across the direction of flow is greater than the area of the measuring field (48) across the direction of flow immediately after the inlet opening (38).

See the attached Appendix for the changes made to effect the above paragraphs.

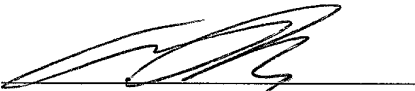
30197379v1

REMARKS

Early and favorable action is earnestly solicited.

Respectfully submitted,

PILLSBURY WINTHROP LLP

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Enclosure: Appendix

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

3. (Amended) Device according to [any of claims 1 and 2] claim 1, characterised in that the periphery of the other limiting surface extends to reach an outer wall (36) of the measuring cell (10) and that a intermediate space occurs between the periphery of the said one limiting surface and the outer wall (36) to form a peripheral field (54).

4. (Amended) Device according to [any of claims 1-3] claim 1, characterised in [tht] that the distance between the limiting surfaces is adjustable within the range of 0.5-5 mm.

5. (Amended) Device according to [any of claims 1-4] claim 1, characterised in that the inlet opening (38) is positioned centrally with regard to the said one limiting surface to obtain a radial suspension flow in the measuring field (48) having circular limiting surfaces, with a pressure that diminishes in a radial direction.

6. (Amended) Device according to [any of claims 1-9] claim 1, characterised in that the other limiting surface is rotatable by the aid of a motor (72).

7. (Amended) Device according to [any of claims 2-6] claim 1, characterised in that the area of the inlet tube (42) across the direction of flow is greater than the area of the measuring field (48) across the direction of flow immediately after the inlet opening (38).

8. (Amended) Device according to [any of claims 1-7] claim 1, characterised in that the said outer wall (36) of the measuring cell (10) is provided with stop elements (66, 68) to limit the movement of the piston cylinder in an upper and a lower position.

9. (Amended) Device according to [any of claims 1-8] claim 1, characterised in that the inlet opening (38) is positioned centrally with regard to the said one limiting surface to obtain a radial suspension flow in the measuring field (48) with a pressure that diminishes in a radial direction.

10. (Amended) Device according to [any of claims 1-9] claim 1, characterised in that the moveable limiting surface can rotate with the aid of a motor (72).

11. (Amended) Device according to [any of claims 2-10] claim 1, characterised in that the area of the inlet tube (42) across the direction of flow is greater than the area of the measuring field (48) across the direction of flow immediately after the inlet opening (38).

END OF APPENDIX

21 -12- 2000

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CLAIMS

1. Device for measuring fibre properties in a flowing suspension, which device includes a measuring cell (10) in which there is a measuring field (48) defined between two limiting surfaces and a means (56) of adjusting the width of the measuring field (48), the limiting surfaces having two opposing, transparent sections (60, 62) that allow illumination through the flowing suspension passing through and measurement by optical means, and the measuring cell (10) having an inlet opening (38) intended for the whole of the suspension flow and an outlet opening (40) intended for the whole of the suspension flow, characterised in that the inlet opening (38) extends through one of the limiting surfaces.

2. Device according to claim 1, characterised in that an inlet tube (42) for directing and stabilising the suspension flow is connected to the inlet opening (38) and has a length that is greater than its width.

3. Device according to any of claims 1 and 2, characterised in that the periphery of the other limiting surface extends to reach an outer wall (36) of the measuring cell (10) and that a intermediate space occurs between the periphery of the said one limiting surface and the outer wall (36) to form a peripheral field (54).

4. Device according to any of claims 1-3, characterised in that the distance between the limiting surfaces is adjustable within the range of 0.5-5 mm.

5. Device according to any of claims 1-4, characterised in that the inlet opening (38) is positioned centrally with regard to the said one limiting surface to obtain a radial suspension flow in the measuring field (48) having circular limiting surfaces, with a pressure that diminishes in a radial direction.

6. Device according to any of claims 1-9, characterised in that the other limiting surface is rotatable by the aid of a motor (72).

7. Device according to any of claims 2-6, characterised in that the area of the inlet tube (42) across the direction of flow is greater than the area of the measuring field (48) across the direction of flow immediately after the inlet opening (38).

Article
34

Measuring fibre properties

The present invention relates to a device that allows the measurement of fibre properties in a flowing suspension, which device includes a measuring cell in which there is a measuring field defined between two limiting surfaces and a means of adjusting the width of the measuring field, the limiting surfaces having two opposing, transparent sections that allow illumination through the flowing suspension passing through and measurement by optical means, and the measuring cell having an inlet opening intended for the whole of the suspension flow and an outlet opening intended for the whole of the suspension flow.

The basic principle for a measurement of the intended type is that the fibres are introduced into a measuring chamber. In the measuring chamber, the fibres are illuminated and observed by an optical system. The optical system has a limited depth of focus. This requires that the extension of the measuring chamber must be less than the depth of focus. This is to make it possible to obtain sharp images of the fibre and means that the dimensions are normally very small, which in turn leads to major problems in eliminating blockage of the measuring chamber.

One example of this basic principle is the so-called Kajaani meter (FS200), that today allows a standard method for analysing the length of fibres in the laboratory. In this known meter, fibres flow through a capillary with a diameter of 0.2-0.4 mm. The advantage of a capillary is that the fibre is oriented in two planes. Measurement of it is facilitated when the fibre is oriented in the direction of flow. The problem here is that the capillary blocks easily if larger particles also follow in the flow. Such a meter is therefore not suitable for use on-line in the processing industry when impurities can occur and at the same time as one has extreme demands on the availability of the measuring instrument.

In the measurement systems Optikappa and PQM, which relate to an on-line arrangement for measuring the quality of fibres, the fibres have to flow through a glass cuvette of sufficiently large dimensions so that the risk of it becoming blocked is very small. The dimensions across the area of flow are 10x10 mm. This has been used in a factory environment for some considerable time and works satisfactorily on-line with good availability. However, the problem with this solution is that it does

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not allow sufficiently good optical focus in the imaging.

US 5,311,290 describes a measuring device for measuring in a column-shaped section. Here, a flow of fibres surrounded by a flow of pure water is processed in the measurement section. This is claimed to reduce the risk of blockage due to bundles of
5 fibres, fibre flocculation and/or so-called straggles. One therefore avoids the use of very narrow measuring columns.

Swedish application No. 870 44 85-5 describes a device for preparing a suspension for measuring in a column-shaped measuring section with high concentrations of fibre. The principle is built on there being a narrower column immediately in
10 front of the measuring column where energy is supplied in the form of a rotating impeller that is arranged to disrupt flocculation and larger impurities. As the impurities are broken down, the risk of blockage is consequently reduced.

US 3,740,156 shows how a sample is captured between two windows that are moveable across the direction of flow.

15 EP 0 302 009 shows two moveable windows in a channel.

Both latter named arrangements do not, however, work satisfactorily in a flow containing fibres when one wants to measure the particle size distribution of the fibres in a manner that is fully statistically correct. There is a large risk of fractiona-
tion caused by the gradient of the flow as only part of the passage is closed.

20 The present invention takes into consideration many of the disadvantages of the designs named above and is characterised firstly in that the inlet opening extends through one of the limiting surfaces.

Advantageous embodiments of the new measurement device are evident from the non-independent claims 2-7.

25 The new design allows optical measurement of fibre properties with both high precision and good focus, whereby the problem of blockage of the measuring field is at the same time eliminated in a simple and practical manner. In addition, with one preferred embodiment, it is possible to obtain a measurement flow that is better than described in US 5,311,290. In the present case, the direction across the flow in the
30 x/y plane can be considered as indefinite. The flow can also be considered as flow in a thin indefinite plane between two permanent limiting surfaces. Well-defined mea-
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2a

During conditions thus exist with little influence of disturbing edge effects.

There is little risk of blockage according to the invention as the fibres flow through a measuring field whose width can be altered. During measurement, the measuring field is given a width so that a good image of the particles being studied is

5

obtained. The measurement is representative as the whole of the flow passes between the measuring field. Between measuring sequences, the measuring column can be widened so that it can be flushed clean, preferably with water.

This solution does not necessarily require any rotating parts in the actual measuring cell, which is, however, the case with the design according to Swedish application no. 870 44 85-5.

The invention will now be described in more detail below with reference to the enclosed drawings, whereby:

Fig. 1 shows a plane view of the new measuring device connected in the correct configuration for on-line measurement in connection with a conventional process line from the side and partly in section;

Fig. 2 shows a side section of the new measuring device and its key components;

Fig. 3 shows a section along line A-A in Fig. 2 whereby the size of the sectional view is greatly reduced; and whereby

Fig. 4 shows a possibility for rotation in one of the parts included in the device according to Fig. 2.

Identical parts that appear in the different figures have been assigned identical numerical designations.

The measuring cell 10 shown in Fig. 1 includes a loop 12 in which the suspension flow intended for the measurement of fibre properties circulates. Samples are removed with a sampler 14 from a process line 16 with a direction of flow indicated by the arrow and are flushed over to a tank 18. In the present case, the sample is diluted in tank 18 with water from a line 20 via a valve 22 to obtain a suitable suspension. The suspension is pumped from tank 18 to measuring cell 10 by a pump 24. Afterwards, the suspension flow is returned from measuring cell 10 to tank 18. When measurement of all of the intended suspension flow has been completed, a valve 28 opens and the system is emptied via waste outlet 30.

The actual measuring cell 10 and its key parts for the invention are more evident in Fig. 2. Measuring cell 10 has the shape of a cylindrical measuring cell that is limited by a plane circular upper wall 32 and a plane circular lower wall 34. The cylindrical wall 36 of the measuring cell and both circular walls 32, 34 are all suitably

manufactured in metal. There is a central inlet opening 38 for a suspension flow in the middle of lower wall 34 and an equivalent outlet opening 40 in cylindrical wall 36. In the current example, the axes for both openings 38, 40 form an angle of 90° to one another. A cylindrical inlet pipe 42 to direct and stabilise the incoming suspension flow is connected to inlet opening 38. Inlet pipe 42 has a length that is several times greater than its width. Inside measuring cell 10, there are two glass plates 44, 46 that are flat and parallel with one another. A measuring field 48 for the suspension flow is defined between both glass plates 44, 46. The suspension flow enters via inlet opening 38 in lower wall 34 and a central opening 50 in the lower glass plate 34 that is associated with inlet opening 38 and located at its centre.

As is evident from the drawing, the periphery of upper glass plate 46 is sealed against the inside of cylinder wall 36 of measuring cell 10. This makes use of standard technology using circular gaskets 52. Lower glass plate 44 does not, however, extend at its periphery all the way to the inner limiting surfaces of measuring cell 10 but instead leaves an intermediate ring-shaped space 54. This means that a centrally incoming suspension flow will pass radially outwards in measurement field between both glass plates 44, 46 whereby the pressure of the suspension flow is greatest at the actual inlet opening 38 and then diminishes towards ring-shaped space 54.

As is also evident from the drawing, upper glass plate 46 forms a cylindrical piston that can be raised and lowered inside measuring cell 10 via positioning equipment such as a pressurised air-driven piston rod 56 so that the width of the measuring field 48 can be changed according to wish. In this way, the desired width of the measuring field can be obtained and thus also a sufficient depth of focus in the measurement. In the embodiment shown, identical light sources 58 are placed in connection with the outside of the underside of lower wall 34 to pass light through the suspension flow in measurement field 48 via respective transparent windows 60, 62 in both glass plates 44, 46. Inside measuring cell 10, there are equivalent cameras 64 for registering the image. The number of light sources 58 and cameras 64 can naturally vary according to wish. Fig. 2 shows only two light sources 58 and thus two interacting cameras 64.

The measuring area comprises only a part of the total surface area of the respective glass plates 44, 46 so that the measurement will not be dominated by edge effects.

As upper glass plate 46 can be raised and lowered within an area that is limited by equivalent stop devices 66, 68 arranged on cylinder wall 36, it is easy to widen the measuring field 48 to flush it clean with water as needed before the measurements continue. In this way, measuring field 48 does not need to be back-flushed, which is the usual means of operation with conventional designs.

It has been shown that in small measurement fields 48 (e.g. 0.5 mm), a very effective disintegration takes place in the actual measurement field due to the shear flow that arises there. This is positive and important for the measurement of fibre-containing suspension flows where one wants to keep the suspended particles dispersed during measurement and it further emphasises the value of measuring in narrow, flat measurement fields. The system of recirculation improves the conditions even more.

There is, however, a risk that particles or conglomerates of particles that are too large become blocked before the measuring field 48. By choosing fibre concentrations suitable for the conditions (0.02 gram per litre, which is very low), and suitable flow rates (greater than 1 m/sec), the fibres can nevertheless normally pass through measuring field 48 and so that a blockage in the suspension flow only occurs as an exception. With the present invention, it thus has to be accepted that occasional measurements can be disturbed if occasional too large particles accompany the sample. This will not cause the measurement system to cease to function as it is self-cleaning. By running double samples and checking the deviation between the double samples, one can ensure that the measurements are correct. If too large a deviation is seen, the sample can be re-run.

Fig. 3 shows the lower glass plate 44 of the measuring field 48. The suspension flow enters through the inlet opening 38 and flows radially outwards from the centre of the lower glass plate 44 towards the periphery, as is marked by arrows. The entire suspension flow passes this way. The suspension flow has its full pressure at the inlet opening 38 and this diminishes radially outwards in the measuring field 48, after which the suspension is collected in the annular-shaped collection ring 54 following the drop in pressure across measuring field 48. The suspension flow finally passes through the outlet opening 40 and back to the tank 18 (Fig. 1).

Fig. 4 shows an example of how the moveable upper glass plate 46 can rotate with the aid of a motor 72. The suspension flow enters via inlet opening 38, passes measuring field 48 and finally flows out via outlet opening 40 (Fig. 2). In this way,

increased shearing forces are obtained in the measuring field. This is possible due to the rotational symmetry of the design. The flow through in measuring field 48 is facilitated and the opportunity to influence the fibres mechanically is increased via the increased shearing forces in the suspension when the measuring cell is used to perform flexibility

5 measurements according to SE 465 983.

Modifications of the arrangement described above with reference to the drawings are naturally possible within the scope of the following claims.

[illegible]

CLAIMS

1. Device for measuring fibre properties in a flowing suspension characterised in that it includes a measuring cell (10) in which there is a measuring field (48) defined between two limiting surfaces and a means (56) of adjusting the width of the measuring field (48), that the limiting surfaces have two opposing, transparent sections (60, 62) that allow illumination through the flowing suspension passing through and measurement by optical means, plus that the measuring cell (10) has an inlet opening (38) intended for the whole of the suspension flow and an outlet opening (40) intended for the whole of the suspension flow.
2. Device according to claim 1 characterised in that the inlet opening (38) extends through one of the limiting surfaces and that an inlet tube (42) for directing and stabilising the suspension flow is connected to the inlet opening (38) and has a length that is greater than its width.
3. Device according to claim 1 or 2 characterised in that the limiting surfaces of the measuring field (48) are flat and parallel.
4. Device according to any of claims 1-3 characterised in that the limiting surfaces of the measuring field (48) are circular.
5. Device according to any of claims 1-4 characterised in that the periphery of the second limiting surface extends to reach an outer wall (36) of the measuring cell (10) and that a intermediate space occurs between the periphery of the said one limiting surface and the outer wall (36) to form a peripheral field (70).
6. Device according to any of claims 1-5 characterised in that the distance between the limiting surfaces is adjustable in the range 0.5-5 mm.

7. Device according to any of claims 1-6 characterised in that the said second limiting surface is part of a moveable piston cylinder (46) and that the said other limiting surface with the inlet opening (38) is stationary.

5 8. Device according to any of claims 1-7 characterised in that the said outer wall (36) of the measuring cell (10) is provided with stop elements (66, 68) to limit the movement of the piston cylinder in an upper and a lower position.

10 9. Device according to any of claims 1-8 characterised in that the inlet opening (38) is positioned centrally with regard to the said one limiting surface to obtain a radial suspension flow in the measuring field (48) with a pressure that diminishes in a radial direction.

15 10. Device according to any of claims 1-9 characterised in that the moveable limiting surface can rotate with the aid of a motor (72).

20 11. Device according to any of claims 2-10 characterised in that the area of the inlet tube (42) across the direction of flow is greater than the area of the measuring field (48) across the direction of flow immediately after the inlet opening (38).

1/1

FIG.1

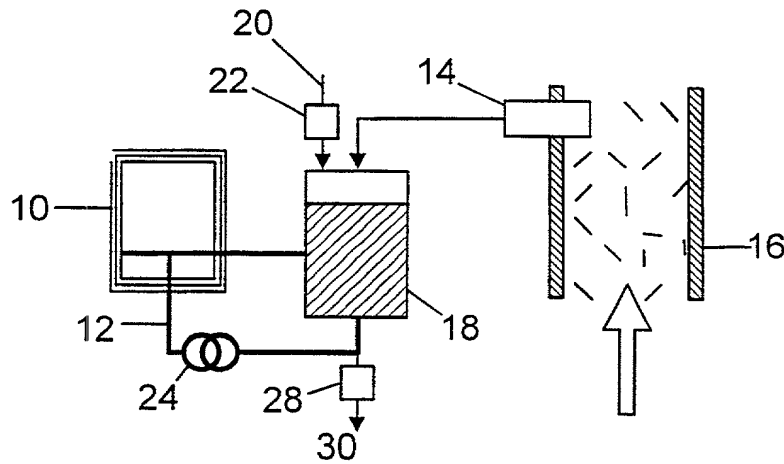


FIG.2

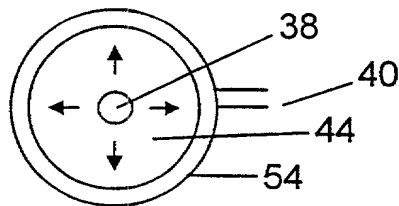
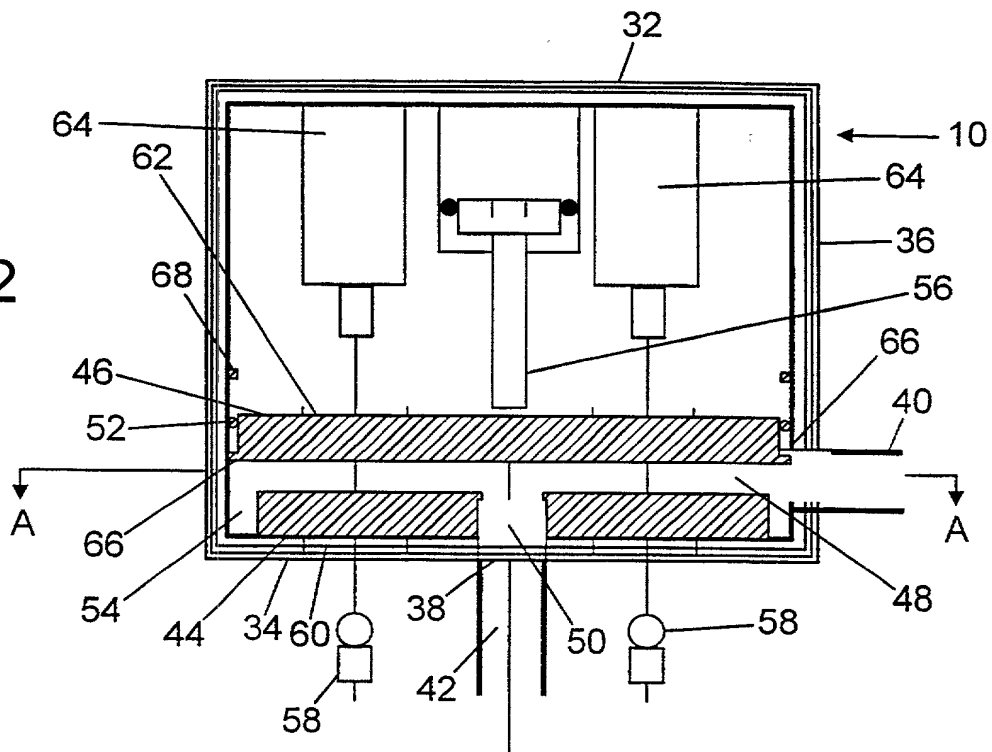


FIG.3

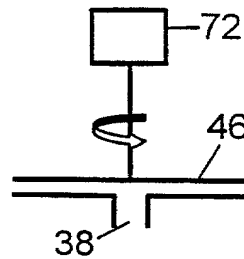


FIG.4

FOR UTILITY/DESIGN
CIP/PCT NATIONAL/PLANT
ORIGINAL/SUBSTITUTE/SUPPLEMENTAL
DECLARATIONS

RULE 63 (37 C.F.R. 1.63)
DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PW
FORM

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the INVENTION ENTITLED MEASURING OF FIBER PROPERTIES

the specification of which (CHECK applicable BOX(ES))
X A. ☐ is attached hereto.
BOX(ES) → B. ☒ was filed on April 18, 2001 as U.S. Application No. 09/
→ C. ☒ was filed as PCT International Application No. PCT/ SE99/01878 on October 19, 1999
and (if applicable to U.S. or PCT application) was amended on December 21, 2000

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56. Except as noted below, I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International Application which designated at least one other country than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT International Application, filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application on which priority is claimed, or (2) if no priority claimed, before the filing date of this application:

PRIOR FOREIGN APPLICATION(S)

Number	Country	Day/MONTH/Year Filed	Date first Laid-open or Published	Date Patented or Granted	Priority NOT Claimed
9803557.9	Sweden	19 OCT 1998			

If more prior foreign applications, X box at bottom and continue on attached page.

Except as noted below, I hereby claim domestic priority benefit under 35 U.S.C. 119(e) or 120 and/or 365(c) of the indicated United States applications listed below and PCT international applications listed above or below and, if this is a continuation-in-part (CIP) application, insofar as the subject matter disclosed and claimed in this application is in addition to that disclosed in such prior applications, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56 which became available between the filing date of each such prior application and the national or PCT international filing date of this application:

PRIOR U.S. PROVISIONAL, NONPROVISIONAL AND/OR PCT APPLICATION(S)

Application No. (series code/serial no.)	Day/MONTH/Year Filed	Status	Priority NOT Claimed
PCT/SE99/01878	19 OCT 1999	pending, abandoned, patented pending	

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint Pillsbury Winthrop LLP, Intellectual Property Group, telephone number (202) 861-3000 (to whom all communications are to be directed), and persons of that firm who are associated with USPTO Customer No. 909 (see below label) individually and collectively my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent, and I hereby authorize them to delete from that Customer No. names of persons no longer with their firm, to add new persons of their firm to that Customer No., and to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/ organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct the above firm and/or an attorney of that firm in writing to the contrary.

USE ONLY FOR
PILLSBURY WINTHROP



00909

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Date: 13 juni 2001

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(include Zip Code)		

- ☐ FOR ADDITIONAL INVENTORS see attached page.
☐ See additional foreign priorities on attached page (incorporated herein by reference).

Atty. Dkt. No. P280126

(M#)

Rule 56(a) & (b) = 37 C.F.R. 1.56(a) & (b)
PATENT AND TRADEMARK CASES - RULES OF PRACTICE
DUTY OF DISCLOSURE

- (a) ... Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the [Patent and Trademark] Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability... (b) information is material to patentability when it is not cumulative and (1) It also establishes by itself, or in combination with other information, a prima facie case of unpatentability of a claim or (2) refutes, or is inconsistent with, a position the applicant takes in: (i) Opposing an argument of unpatentability relied on by the Office, or (ii) Asserting an argument of patentability

PATENT LAWS 35 U.S.C.

§102. Conditions for patentability; novelty and loss of right to patent

A person shall be entitled to a patent unless--

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent or
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or
- (c) he has abandoned the invention, or
- (d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months* before the filing of the application in the United States, or
- (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent, or
- (f) he did not himself invent the subject matter sought to be patented, or
- (g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

§103. Condition for patentability; non-obvious subject matter

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made. . . .
- (c) Subject matter developed by another person, which qualified as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

* Six months for Design Applications (35 U.S.C. 172).